

[54] CONTAINER HAVING A METAL
OVERCAP-THERMOPLASTIC LID
CLOSURE ASSEMBLY

[75] Inventor: Leonard Thomas La Croce,
Paramus, N.J.

[73] Assignee: American Can Company,
Greenwich, Conn.

[22] Filed: Apr. 2, 1974

[21] Appl. No.: 457,181

Related U.S. Application Data

[62] Division of Ser. No. 345,262, March 27, 1973, Pat.
No. 3,834,579.

[52] U.S. Cl. 29/432.2; 29/511; 29/520;
53/42; 113/120 XY

[51] Int. Cl. B67b 3/22

[58] Field of Search 113/15 A, 30, 121 R, 120 R,
113/120 Q, 120 XY; 220/60 R, 42, 54, 55,
59, 66, 76; 215/46; 29/434, 436, 445, 453;
53/42; 29/432.2, 511, 520

References Cited

UNITED STATES PATENTS

2,748,976	6/1956	Magnesen	220/60
3,173,574	3/1965	Goldsmith	220/60
3,302,822	2/1967	Edwards	220/60
3,392,873	7/1968	Old	220/42
3,438,537	4/1969	Hendrickson	220/60
3,441,163	4/1969	La Barge	220/54
3,556,336	1/1971	Coop	215/46

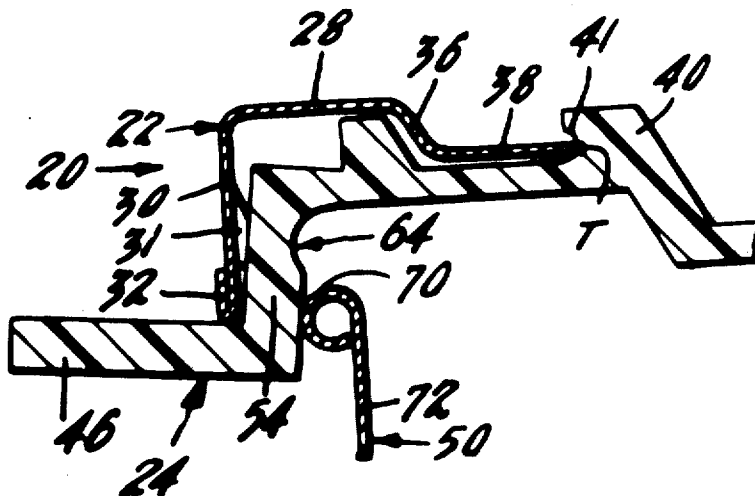
3,626,817	12/1971	McElvey	113/120 XY
3,696,963	10/1972	Saunders	220/42
3,734,333	5/1973	Foss	220/54
3,800,401	4/1974	Jesevich et al.	29/432.2

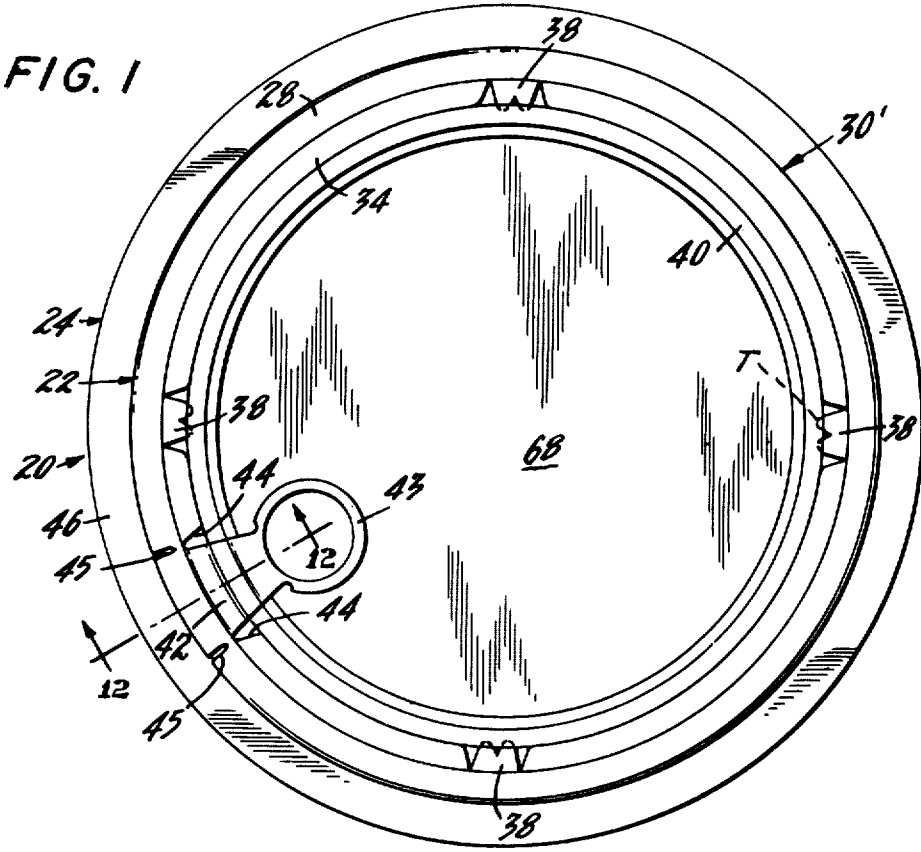
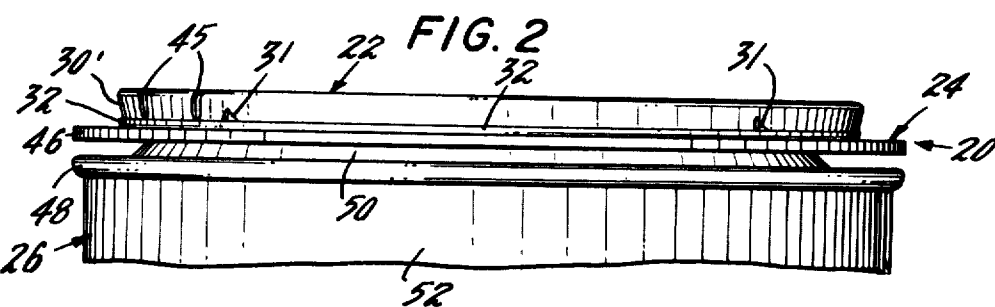
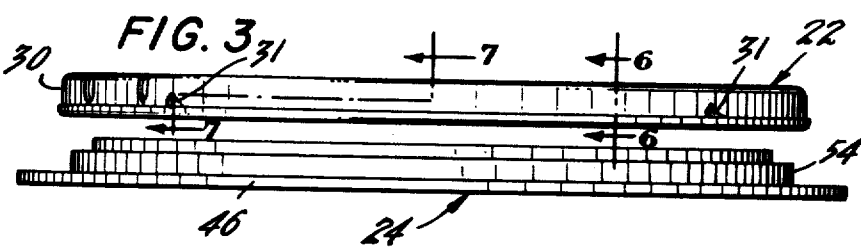
Primary Examiner—Richard J. Herbst
Attorney, Agent, or Firm—Robert P. Auber; Paul R.
Audet; George P. Ziehmer

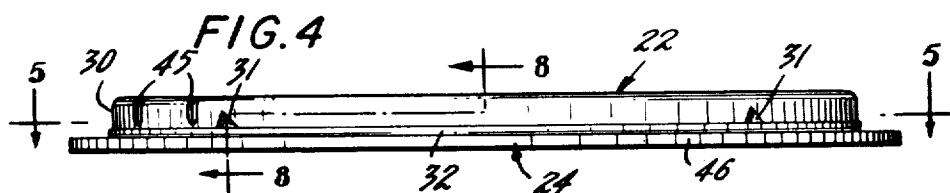
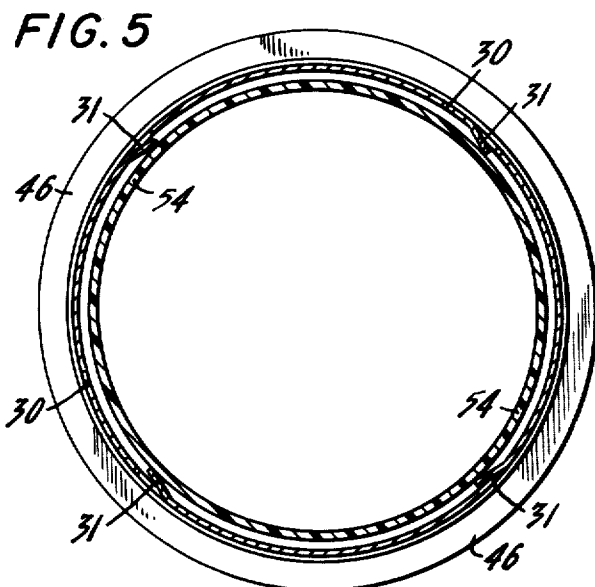
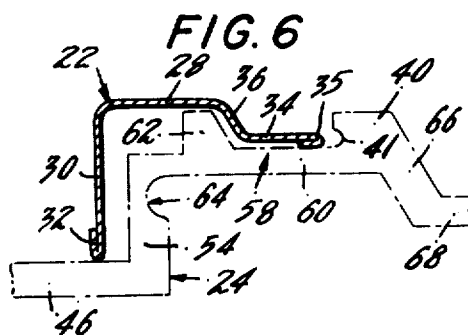
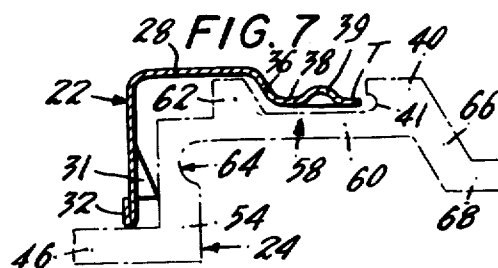
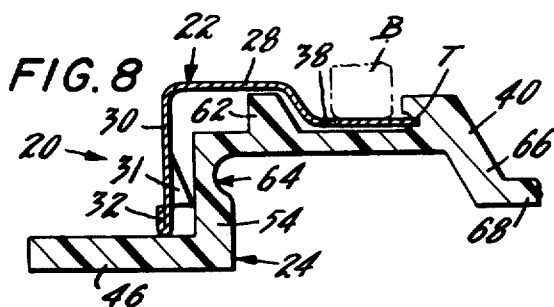
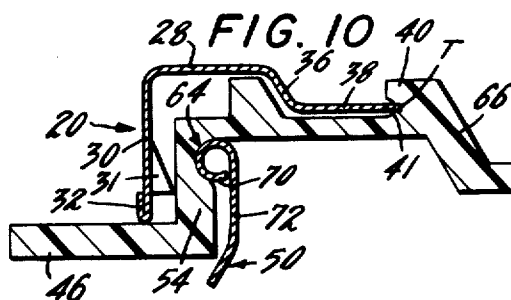
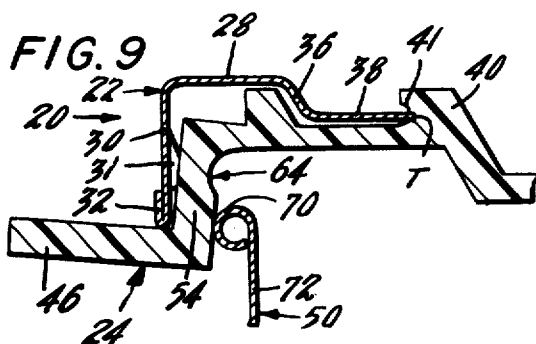
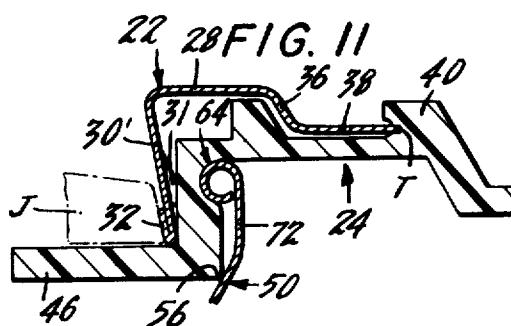
[57] ABSTRACT

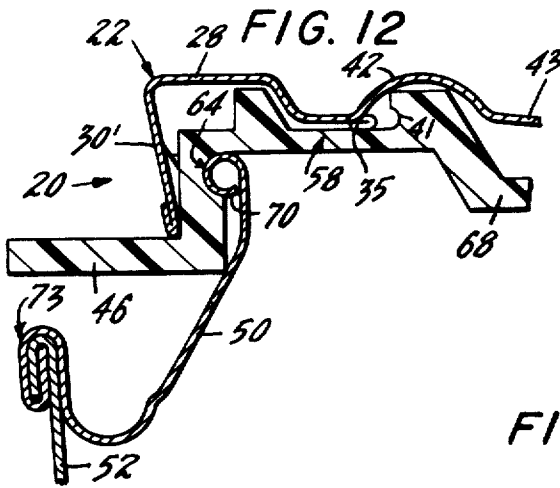
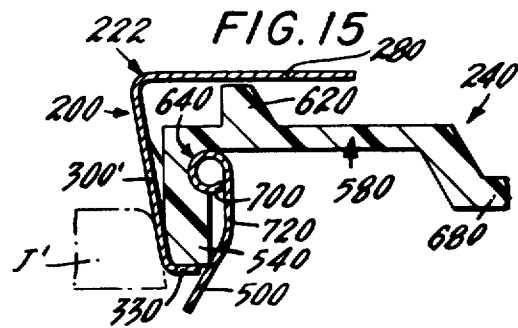
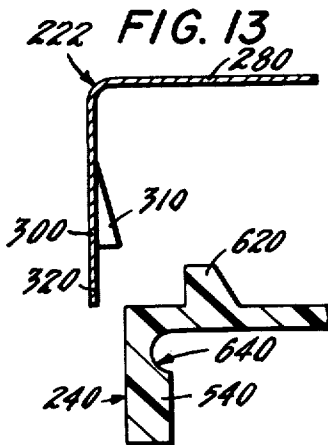
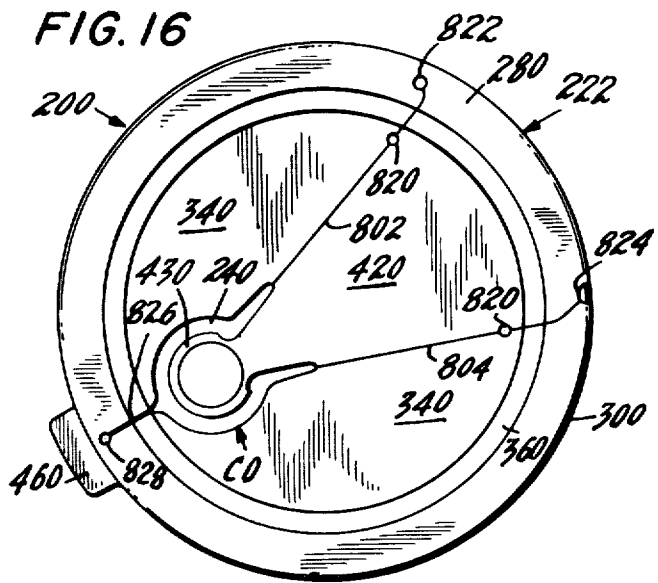
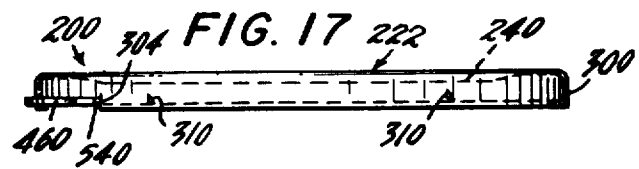
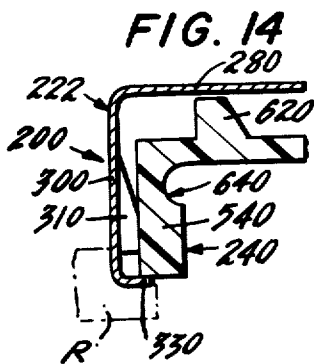
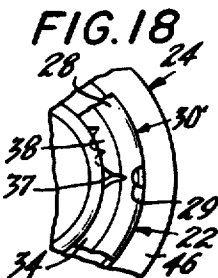
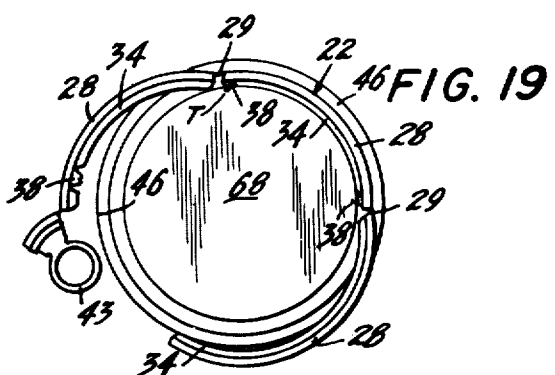
A container is provided having a no-tool, easy-open thermoplastic lid-metal overcap closure assembly thereon. The lid and overcap are secured together to form the assembly by the engagement of overcap tongues in an upwardly-protruding annular retaining bead in the lid in one embodiment wherein the overcap is a retaining ring, and by the engagement of a radially inwardly-extending curl at the base of the overcap skirt with a lower portion of the lid skirt in another embodiment wherein the overcap has a substantially full central panel. The assembly lid and overcap skirts are spaced radially from each other to enable the lid skirt to bow outwardly as it passes over the bead on the container throat when the assembly is being placed on the container. The assembly is removably secured to the container by seating and abuttingly engaging an undercut adjacent the junction of the lid rim and skirt with the container throat bead and by crimping the lower portion of the overcap skirt against a corresponding portion of the lid skirt.

2 Claims, 19 Drawing Figures









CONTAINER HAVING A METAL OVERCAP-THERMOPLASTIC LID CLOSURE ASSEMBLY

This is a division of application Ser. No. 345,262, filed Mar. 27, 1973, now U.S. Pat. No. 3,834,579.

BACKGROUND OF THE INVENTION

This invention relates to containers and container closures, and has particular reference to container closure assemblies which include a metal overcap and a reclosable thermoplastic lid.

In conventional container closure assemblies, the metal overcap usually secures the plastic lid to the container during shipment and until the container is opened by first removing the metal overcap and then the plastic lid. Thereafter, the lid alone usually provides the reclosure.

Such conventional assemblies have had shortcomings. For example, in one assembly, a cold-formed lid having an annular, essentially vertically depending skirt is placed over and around the mouth of a container. The seal between the lid and container is effected by pressure of an outward curl bead clinched radially inward at the base of the overcap skirt. This has not proven effective since once the metal overcap is removed, the cold-formed lid skirt which had taken the inwardly protruding shape of and relied on the pressure of the clinched curl bead, tends to regain its original substantially vertical profile and tends not to provide sufficient pressure to effect a satisfactory reclosure seal, especially when the lid is subjected to high temperatures for long periods.

Another shortcoming is that such cold-formed lids tend to stress crack from curl bead pressure, especially when contacted by corrosive products such as certain paints.

It is an object of this invention to overcome the above and other shortcomings. Accordingly, an object is to provide a container having a thermoplastic lid-metal overcap closure assembly which provides an effective reclosure seal between the lid and container after the overcap is removed from the container.

Another object of this invention is to provide a container having such an assembly wherein stress cracking of the lid is eliminated.

Another object of this invention is to provide a container having such an assembly wherein the closure assembly is easily opened and closed without use of tools.

Still another object of this invention is to provide for such an assembly a thermoplastic lid that is easy to remove and replace on the container, that provides effective reclosure seals and, in one embodiment, tends to protect the metal overcap from accidentally being removed from the lid and/or container.

Another object of this invention is to provide such an assembly that is economical to manufacture and easy to initially assemble and secure to a container.

These and other objects and advantages will be apparent as it is better understood from the description which follows, which, taken in conjunction with the drawings, discloses preferred embodiments thereof.

SUMMARY OF THE INVENTION

This invention is a container comprising a container body; a substantially rigid, upwardly-extending throat joined to one end of the container and having at its uppermost end a radially outwardly protruding bead; and

a thermoplastic lid-metal overcap assembly in the form of (1) a reclosable thermoplastic lid having: a top portion including a peripheral raised rim, a portion of which abuttingly overlies the bead, an upwardly-protruding retaining member, a recessed central panel radially inward of the rim, and an annular sloping panel connecting the rim and the recessed central panel; a peripheral molded skirt, such skirt having an undercut molded into its interior surface adjacent the junction of the rim of the skirt, the undercut being in abutting engagement with the bead to removably secure the lid to the throat; and, (2) a removable metal overcap overlyingly engaging the lid and having a raised rim overlying the lid rim, a peripheral skirt having engaging means thereon for engaging the lid skirt, a recessed interior panel portion radially inward of the overcap rim, and a sloping connecting panel connecting the rim with the overcap skirt. The overcap skirt, except at its engaging means, is spaced from the lid skirt and effects a substantially fixed radial positional relationship between the overcap and lid and maintains the lid skirt in secured engagement with the throat bead until the overcap is removed from the lid and container. The overcap recessed interior panel portion has retainer means which engage the lid retaining member and thereby removably secure the overcap to the lid. The overcap recessed interior panel portion also has an integral pull ring appended to the overcap rim by a segment of the interior panel portion. The overcap skirt rim and recessed interior panel portion have radial cutouts therein which cooperate with the pull ring to facilitate removal of the overcap from the lid.

The recessed interior panel portion can be an annular shelf or a substantially full and substantially horizontal central panel. When it is an annular shelf, the lid retaining member is an annular retaining bead preferably having a groove in its radial outer wall, and the overcap retainer means preferably include a plurality of circumferentially spaced tongues whose terminal edge portions are in locked engagement with the lid retaining bead.

The overcap skirt engaging means include an annular radially inwardly-sloping lower skirt portion whose lower edge portion engages a lower portion of the lid skirt. The engaging means of the overcap skirt preferably also include at least three integral radially inwardly-projecting darts. Preferably, the lid also includes grasping means which can be a peripheral substantially horizontal flange integral with and extending radially and horizontally outwardly from the lower end of the lid skirt to a point beyond the overcap skirt lower edge portion.

When the recessed interior panel portion of the metal overcap is a substantially full central panel, it has an integral pull ring at the beginning of the tear strip defined by scoring dividing the central panel and terminating in the overcap rim, a U-shaped cutout encompassing the pull ring and an adjoining portion of the tear strip adjacent the pull ring, cutouts along the scoring and in the rim terminating the scoring, and a slit running radially from the U-shaped cutout to the rim.

This invention also is in a method of forming the aforementioned container, which comprises: separately forming the thermoplastic lid and the metal overcap, said forming of the lid and overcap including the step of providing a space between the overcap and lid skirt sufficient to allow the lid skirt to bow outwardly when

it passes over the throat bead as the lid and overcap are placed on the container.

overlyingly engaging the overcap and the lid so that the darts engage the outer surface of the lid skirt to thereby place the lid in a substantially fixed, centralized, spatial radial positional relationship with the overcap.

engaging the overcap tongue terminal edge portions in the lid annular retaining bead thereby removably securing the overcap to the lid and forming a thermoplastic lid-metal overcap container closure assembly.

removably securing the assembly to the throat bead by pressing the assembly over the throat and allowing the lid skirt to bow outwardly into the space between the overcaps and lid skirts as the lid skirt passes over the bead, and,

engaging the lower edge portion of the overcap skirt with a lower portion of the lid skirt to prevent the lid skirt of the secured assembly from bowing outwardly and from accidentally coming out of abutting engagement with the throat bead.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view of a thermoplastic lid-metal overcap assembly on a container.

FIG. 2 is a fragmentary side elevation of the assembly and container of FIG. 1.

FIG. 3 is a side elevation showing the metal overcap and thermoplastic lid separated from each other prior to being assembled and placed on a container.

FIG. 4 is a side elevation of the thermoplastic lid-metal overcap assembly prior to its being assembled to a container.

FIG. 5 is a reduced cross section taken substantially along line 5—5 of FIG. 4.

FIG. 6 is an enlarged fragmentary cross section taken substantially along line 6—6 of FIG. 3 showing the overcap overlyingly engaging the lid.

FIG. 7 is an enlarged fragmentary cross section taken substantially along line 7—7 of FIG. 3 showing the position of the overcap tongues prior to the overcap and lid (dashed) components being secured together.

FIG. 8 is an enlarged fragmentary cross section taken substantially along lines 8—8 of FIG. 4, showing the overcap and lid being secured together.

FIG. 9 is an enlarged cross section showing the assembly of FIG. 8 being placed on a container throat.

FIG. 10 is an enlarged cross section showing the assembly of FIG. 9 being removably secured to a container.

FIG. 11 is an enlarged cross section showing the overcap skirt being crimped to the lid skirt to removably secure the assembly to the container.

FIG. 12 is an enlarged cross section taken through the overcap pull ring substantially along line 12—12 of FIG. 1.

FIG. 13 is an enlarged cross section taken through another embodiment of the overcap and lid of this invention prior to their being assembled.

FIG. 14 is an enlarged cross section showing the overcap and lid of FIG. 13 secured together by means of the overcap curl engaging a lower portion of the lid skirt.

FIG. 15 is an enlarged cross section showing the overcap and lid of FIG. 14 on a container, the overcap skirt being crimped to the lid skirt to removably secure the assembly to the container.

FIG. 16 is a top plan view of a modified version of this invention wherein the metal overcap has a substantially full central panel.

FIG. 17 is a side elevation of the assembly of FIG. 16.

FIG. 18 is an enlarged partial section of a modified version as would be taken of the tongue area adjacent the 3-o'clock position on the overcap of FIG. 1.

FIG. 19 is a top plan view of an overcap modified as in FIG. 18, being removed from a lid and container.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings in detail, FIGS. 1 and 2 show a closure assembly generally designated 20 which includes a metal overcap here shown as retaining ring, generally designated 22, secured to an underlying thermoplastic lid, generally designated 24. Assembly 20 is removably secured to a container 26. Metal overcap 22 has a raised rim 28, a peripheral skirt 30' which adjoins and depends downwardly from the rim and has a hem 32, and a recessed interior panel portion, here shown as a ledge 34, radially inward of and connected to the rim by a sloping connecting panel 36 (FIGS. 6—12). Ledge 34 has a plurality of spaced retainer means, here shown as tongues 38 which engage a lid retaining member to an annular retaining bead 40 to removably secure overcap 22 to lid 24. Ledge 34 also has a segment 42 which appends an integral pull ring 43 to overcap rim 28.

Lid 24 has a peripheral, substantially horizontal flange 46 extending radially outwardly over double seam 48 which secures an annular ring 50 to container body 52. On either side of ledge segment 42, there are opening cutouts 44 radially aligned with narrow cuts 45 in overcap rim 28 and extending outwardly into overcap skirt 30.

Overcap skirt 30' includes engaging means which include darts 31 cut in and spaced from each other around the circumference of skirt 30'. Darts 31 project radially inwardly so that their respective radially innermost edges contact an adjacent thermoplastic lid skirt in a manner to be explained.

FIG. 3 is a side elevation of the components of the container closure assembly of this invention, prior to their being secured to container 26. As shown in FIGS. 3 and 4, in the method of forming the thermoplastic lid-metal overcap container closure assembly 20 of this invention, overcap 22 and lid 24 are separately formed, and overcap 22 is brought into vertical alignment with lid 24. When the overcap and lid are brought together (FIG. 4), overcap 22 overlyingly engages lid 24 and encompasses that portion of lid 24 radially interior of lid skirt 54.

As shown in FIG. 5, a cross section taken substantially along line 5—5 of FIG. 4 through overlyingly engaging overcap 22 and lid 24, when the overcap and lid are first brought together overcap skirt is substantially vertical and not crimped (30') as in FIG. 2. Darts 31, integral with and projecting radially inwardly from overcap skirt 30, have their innermost edges engaging the exterior wall of thermoplastic lid skirt 54. FIG. 5 shows that the engaging means, here referring to darts 31, effect and maintain substantially fixed radial positional relationship between the overcap and lid so that lid 24 is centralized within overcap 24 and there is a space provided between the exterior of lid skirt wall 54 and the interior wall of overcap skirt 30.

FIG. 6 is an enlarged cross section taken substantially along line 6—6 of FIG. 3 and shows the profile of overcap 22 (solid line) and shows that it remains substantially the same before and after it is placed on but not yet secured to lid 24 (dashed lines). Overcap skirt 30 depends downwardly and substantially vertically from rim 28 and need not have but is shown having a radially outwardly extending hem 32. Recessed radially interior panel portion, shown as ledge 34, also need not but preferably has a hem 35. Connecting panel 36 slopes between and connects overcap rim 28 with ledge 34. FIG. 6 shows that thermoplastic lid 24 is comprised of a top portion which includes a peripheral raised lid rim generally designated 58 having a first substantially planar portion 60 between annular retaining bead 40 and annular upwardly-protruding stacking ring 62. Lid 24 also includes a peripheral molded skirt 54 which depends substantially downwardly from rim 58 and preferably has an adjoining integral, peripheral flange 46. Lid skirt 54 has an undercut generally designated 64 molded into its interior surface adjacent the junction of rim 58 and skirt 54. Radially inward of retaining bead 40 is an annular sloping panel 66 connecting raised rim 58 with a full, substantially planar, recessed central panel 68. FIG. 6 shows that ledge hem 35 can rest on lid rim planar portion 58 and preferably the hem's radial inner edge is spatially removed from groove 41 so that overcap 22 can be easily placed over lid 24 without interference between ledge hem 35 and retaining bead 40.

FIG. 7, a cross section of overcap 22 taken substantially along lines 7—7 of FIG. 3, shows the profile of an overcap dart and tongue. It shows that the tip of dart 31 engages the exterior wall of lid skirt 54, and that tongues 38 have a bead therein before overcap 22 and lid 24 are secured together. Bead 39 permits tongue tip T to be in a withdrawn position, radially away from the head of annular retaining bead 40, as is hem 25 in FIG. 6 so that overcap 22 can easily be placed on lid 24.

FIG. 8, a cross section taken substantially along lines 8—8 in FIG. 4, shows that when overcap 22 and lid 24 are brought together in an overlyingly engaging relationship, bead 39 is spanked or bumped and substantially flattened or removed by a suitable tool such as bumper B. This drives and engages the terminal edge portion or tongue tip T within bead groove 41 and into the thermoplastic material of annular lid retaining bead 40. Driving tongue tip T into bead 40 removably secures overcap 22 to lid 24 to form the container closure assembly 20 of this invention. It is to be noted that in container closure assembly 20, there still exists the spatial relationship provided between overcap skirt 30 and the outer surface of lid skirt 54. This spatial relationship, as shown in FIG. 9, is important since it allows lid skirt 54 to bow outwardly as assembly 20 is pushed downwardly over a radially outwardly protruding annular bead, here shown as a curl bead 70 around the uppermost portion of a substantially upwardly extending throat 72 on an annular paint can ring 50. During this action, darts 31 flex radially outwardly toward overcap skirt 30 and thereby allow lid skirt 54 to bow outwardly when assembly 20 is placed on a container.

FIG. 10 shows container closure assembly 20 of FIG. 9 removably secured to annular ring 50. Lid skirt 54 after having bowed outwardly as it was being moved over curl bead 70, has regained its substantially vertical profile as lid skirt 64 is seated on and juxtaposingly and

abuttingly engages curl bead 70 adjacent the junction of lid rim 58 and lid skirt 54 to removably secure assembly 20 to the container. Dart 31 has likewise tended to regain its initial profile. Its outermost edge still engages the exterior wall of lid skirt 54.

As shown in FIG. 11, once container closure assembly 20 is removably secured to the container, as in FIG. 10, suitable means such as jaws J, or a roller, are used to crimp, clinch, roll or otherwise bring the lower portion of overcap skirt 30 substantially into engagement with a lower portion of lid skirt 54 so that the lower portion of overcap skirt 30 acts as part of the engaging means which effects a substantially fixed radial positional relationship between overcap 22 and lid 24 and which prevents lid skirt 54 from bowing outwardly and lid undercut 64 from coming out of abutting engagement or securement with curl bead 70. Thus, overcap skirts 30 initially is substantially vertically downwardly depended, but when crimped (30'), angles radially inward toward lid skirt 54 when the closure assembly is finally removably secured to the container. Crimping overcap skirt inwardly 30' often causes the lower inner portion 56 of lid skirt 54 to engage throat 72 of annular ring 50 so that skirt 54 is held more securely between hem 32 and throat 50.

FIG. 12, a cross section taken substantially along line 12—12 of FIG. 1, shows that overcap 22 has an integral pull ring generally designated 43, appended to overcap rim 28 by ledge segment 42. FIG. 12 also shows that annular ring 50 can be joined to container body 52 in any suitable manner such as by a conventional double seam 73.

FIG. 13 is an enlarged fragmentary sectional view of a modified version of a metal overcap, here designated 222, vertically aligned over thermoplastic lid 240. As shown in FIG. 13, overcap skirt 300 has darts 310 therein and is not hemmed, and lid skirt 540 does not have a flange but terminates in a downward direction.

FIG. 14 shows that when overcap 222 and lid 240 are initially assembled and brought into an overlyingly engaging relationship, the lower terminal edge 320 of overcap skirt 300 has a curl 330 which is curled substantially horizontally and radially inward under lid skirt 540 to act as an engaging means and engage the bottom edge thereof, to thereby effect a substantially fixed radial positional relationship between the overcap and lid until the container closure assembly 200 is secured to a container. Darts 310 again centralize lid 240 within overcap 222 and maintain a spatial relationship between overcap skirt 300 and lid skirt 540. As previously explained, the spatial relationship allows lids skirt 540 to bow outwardly when the initially-assembled assembly is removably secured to a container.

In FIG. 15, assembly 200 is shown removably secured to throat 720 of the annular ring 500 of the container. The lower portion of overcap skirt 300' is shown crimped radially inward by jaw J' so that the lower inner edge of lid skirt 540 tends to partially engage the outer surface of container throat 720. In this embodiment, the crimped lower portion of overcap skirt 300' and curl 330 are included within the overcap skirt engaging means which effects the substantially fixed radial positional relationship between the overcap and lid and prevents the lid skirt from bowing outwardly and undercut 640 from coming out of abutting engagement with curl bead 700. When the engaging means includes curl 330, overcap 222 need not include tongue or other

retaining means and lid 240 need not contain upwardly protruding retaining members such as retaining bead 40. Overcap rim 280 is shown broken away but it can be hemmed or can have a connecting panel and a substantially full central panel as shown below.

FIG. 16 is a top plan view of another embodiment of the container closure assembly of this invention. More particularly, FIG. 16 shows a metal overcap generally designated 222 having a top portion which includes peripheral raised rim 280, a recessed interior panel portion, here, a substantially full and substantially horizontal central panel, 340, and a substantially triangular tear strip 420 defined by score lines 802, 804 dividing the central panel, and having score cutouts 820 in the score lines which terminate in respective terminating cutouts 822 in rim 280, and 824 in the rim and extending partway into overcap skirt 300. Tear strip 420 has, at its narrow beginning portion, an integral pull ring 430 that is in substantially the same plane as the tear strip. Central panel 340 has a cutout CO encompassing pull ring 430 and an adjoining portion of tear strip 420. Cutout CO has, running from its periphery, opposite tear strip 420, a slit 826 running radially outwardly from cutout CO to and terminating in cutout 828 in raised rim 280. Thermoplastic lid 240 underlying overcap 222 has grasping means in the form of a pull tab 460 extending radially and horizontally outward from the lower end of its lid skirt.

FIG. 17, a side elevation of container closure assembly 200 of FIG. 16, shows full overcap 222 having been brought together with and being in overlying engagement with thermoplastic lid 240 (dashed lines), the overcap having a gate 304 cut in its skirt 300 for accommodating pull tab 460 which extends radially and horizontally outwardly from lid skirt 540, as did flange 46 in the previous embodiment. Overcap 222 has darts 310 in its skirt 300 which centralize lid 240 within overcap 222 and maintain a substantially fixed spatial relationship between the lid skirt and overcap skirts. This spatial relationship allows lid skirt 540 (not shown) to bow outwardly as previously explained when assembly 220 is removably secured to a container. Full overcap skirt 300 then is crimped to obtain a profile substantially as shown in FIG. 15.

FIG. 18 is an enlarged fragmentary top plan view of another embodiment of closure assembly 20 as would be taken adjacent the tongues 38 located at about the 12 and 3 o'clock positions on overcap 22 of FIG. 1. More particularly, FIG. 18 shows that overcap 22 can have cutouts 29 adjacent the junction of overcap rim 28 and overcap skirt 30' (or 30), and ledge 34 can have a cutout 37 adjacent one side of each tongue 38, extending into rim 28 and aligned with and cooperating with cutouts 29 in a manner to be explained, for facili-

tiating removal of overcap 22 from lid 24 and container 26, especially when the engaging means for engaging the overcap with the lid is a curl 330, as shown in FIGS. 14 and 15. When the engaging means includes a lower crimped portion of the overcap skirt such as 30' as in FIGS. 1, 2, 11 and 12, or 300' in 14 and 15, cutouts 29 are not needed since the force resulting from pulling pull ring 43 or 430 upward and tearing through the bridges between for example cutouts 44 and 45 (FIG. 1) and severing hem 32, causes an outward springing action sufficient to disengage tongue tips T from within retaining bead 40 and to clear the tongues radially outwardly of the retaining bead head so that overcap 22 can be lifted upwardly and easily removed from lid 24 without interference by retaining bead 40. When the engaging means adjacent the lower portion of crimped overcap skirt 30' or 300' include an annular curl 330 (FIGS. 14, 15) which can be employed with an overcap, it has been found desirable to provide overcap 22 with cutouts 29. As shown in FIG. 19, as pull ring 43 is manipulated to sever overcap 22 to either side of the pull ring, the aforementioned pair of aligned cutouts provide bend or flex points adjacent the cutouts and divide the overcap into arcuate segments which are easily swung outwardly at the flex points to clear some of the tongue tips T from retaining bead 40 and curls 33 or 330 from skirts 54 or 540 to thereby allow the severed overcap to be easily removed from lid 24, 240 and container 52. Similarly, when pull ring 430 is lifted, score lines 802 and 804 are conventionally gradually torn away from ring 430 toward rim 280, the bridge in skirt 300 adjacent cutout 824 is severed and overcap 22 is divided into essentially two halves which can be separated along severed score 804 and slit 826 due to bending action occurring adjacent cutout 828 and in rim 280, until curl 330 clears skirt 540. Overcap 222 can thus be easily removed from lid 240 and its container (now shown).

The removal of thermoplastic lids 24, 240 is easily effected by grasping peripheral flange 46 or lift tab 460 and exerting sufficient upward force to bow lid skirt 54, 540 outwardly and to disengage and clear undercut 64, 640 and skirt 54, 540 of curl bead 70, 700, on container throat 50, 500. Reclosure of thermoplastic lid 24, 240 is effected by downward pressure of the lid on the container throat.

That the container closure assembly of this invention provides effective initial and reclosure seals is shown in TABLE I below wherein one gallon metal paint cans containing DePont white Lucite ceiling paint and having the aluminum overcap-thermoplastic lid of FIGS. 1 - 12 were tested for failure. Results show that the assembly or its components did not come off, leak or otherwise fail.

TABLE I

TEST CON-DUCTED	CLOSURE ASSEMBLY OR COMPONENT	NO. CANS TESTED	NO. OF TESTS CON-DUCTED	TIME	PRESSURE (PSI)	RESULTS
TIP	ASSEMBLY	12	10 TIPS	—	—	NO FAILURE
	LID ONLY	12	10 TIPS	—	—	"
DROP ¹	ASSEMBLY	6	1 DROP	—	—	"
	LID ONLY	6	1 DROP	—	—	"
SHAKER ²	ASSEMBLY	6	*	5 (Min)	—	"
	LID ONLY	"	"	"	—	"
BLOWOUT ³	ASSEMBLY	6	**	—	22	"
	LID ONLY	"	"	—	"	"

¹Each can was rolled off another upright can whose top surface was 8 inches from the ground.

²Cans were held in the clamp of and shaken by a "Red Devil" horizontal shaker.

It has been found that container closure assemblies of this invention provide better seals than conventional metal plugs for paint cans, since during the example drop tests, when metal plugs failed, they came off the container in their entirety and the entire contents spilled therefrom, but when, under extreme test conditions, the container closure assemblies of this invention fail, there is only slight spitting or spurling of paint contents perhaps due to localized deformation of bead 70, 700 or flexing of the thermoplastic lid and localized temporary release of internal pressure.

The container closure assemblies of this invention can have any suitable configuration sufficient to obtain effective initial and reclosure seals given the configuration of the beaded throats of the particular container employed. The metal overcap is formed of sheet metal or other permanently deformable material and is preferably formed from a thin sheet of aluminum or aluminum alloy. The recessed interior panel portion of the overcap can be full, ledge or intermediary in size so long as it has retainer means thereon which cooperate with and engage a retaining member on the thermoplastic lid. When the retainer means are tongues 38, they can be of any suitable configuration and spaced in any suitable manner so long as they retain the overcap on the lid and can be disengaged therefrom when the overcap is removed by use of its pull ring from the lid and container. For example, when the recessed interior panel is full, the lid can have an integral boss or rivet protruding upwardly therefrom and the overcap can have an aperture therein encompassing the boss or rivet to removably secure the overcap to the lid. Cooperation of the lid retaining member and overcap retainer means should be sufficient to prevent inadvertent openings during for example shipment, but not intended openings by manipulation of the overcap pull ring. The engaging means of the overcap preferably include darts but any other suitable means for centralizing lid 24 within overcap 22 during initial assembly, for providing a spatial relationship between both the overcap and lid skirts and for maintaining the overcap and lids in a substantially fixed radial positional relationship can be employed. Likewise, the engaging means preferably comprising the crimped lower portion of the lid skirt 30', 300' can be any suitable means which restrains lid skirt 54, 540 from bowing outwardly when the assembly is on a container. Such engaging means do not permanently deform the lid skirt. Any indentation or temporary deformation of the lid skirt due to pressure of the crimped overcap skirt does not remain in the lid when the overcap is removed therefrom. It is to be noted that although the pressure from the crimped overcap skirt has restraining effect and provides an effective initial seal, the thermoplastic lid by itself is sufficient to provide an effective seal with or without overcap 22. Once the overcap is removed, the lids, on standing do not lose their original profile and will maintain their original sealing abilities. While undercut 64, 640 is shown profiled to provide an effective seal for a paint can having a curl bead, the undercut could be less deep for containers of contents of lighter weight and pressure such as powder materials, or deeper for example for liquid contents heavier than paint. Retaining member 40 need not have a groove therein but can be solid so long as the member is sufficient to cooperate with the overcap retainer means to maintain the over-

cap and lid assembly in removably secured engagement and to allow retainer means such as tongues 38 to be disengaged when pull ring 43 is manipulated to remove overcap 22 from lid 24. Thermoplastic lid 24 can be of any suitable thermoplastic material such as polyethylene, polypropylene, polyvinyl chloride, etc. which can be suitably molded, which has suitable flexibility, and which provides effective initial and reclosure seals according to this invention.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description and it will be apparent that various changes may be made in the form, construction and arrangement of the parts of the assembly and container and that changes may be made in the steps of the method described and their order of accomplishment without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the forms hereinbefore described being merely preferred embodiments thereof.

I claim:

1. A method of forming a container of the type having
 - a container body;
 - a substantially rigid, upwardly extending throat joined to one end of the container body, the throat having at its uppermost end a radially outwardly protruding bead;
 - a reclosable thermoplastic lid, the lid having
 - a top portion including a peripheral raised rim a portion of which abuttingly overlies the bead, an upwardly protruding annular retaining bead, a recessed central panel radially inward of the rim; and an annular sloping panel connecting the rim and the recessed central panel,
 - a peripheral molded skirt adjoining and depending downwardly from the rim, said skirt having an undercut molded into its interior surface adjacent the junction of the rim and the skirt, the undercut being in abutting engagement with the bead to thereby removably secure the thermoplastic lid to the throat; and
 - a removable metal overcap overlyingly engaging the lid, the overcap having
 - a raised rim overlying the lid rim,
 - a peripheral skirt adjoining and depending downwardly from the overcap rim, the skirt having engaging means for engaging the lid skirt, the engaging means including an annular radially inwardly-sloping lower skirt portion whose lower edge portion engages the outer wall of the lower skirt, and including integral darts in and projecting radially-inwardly from the overcap skirt, the overcap skirt, except for the engaging means, being spaced from the lid skirt, the engaging means effecting a substantially fixed centralized radial positional relationship between the overcap and the lid, preventing the lid skirt from bowing outwardly and from accidentally coming out of abutting engagement with the throat bead,

11

- a recessed annular ledge panel radially inward of the overcap rim, the ledge portion having a segment which appends an integral pull ring to the overcap ring, and having a plurality of circumferentially spaced tongues therein, the terminal edge portions of the tongues being in removably secured engagement with the lid retaining bead, and
- a sloping connecting panel connecting the overcap rim with the overcap skirt, the overcap having radial cutouts therein which cooperate with the pull ring when the pull ring is manipulated to remove the overcap from the lid and container;
- the method which comprises:
- separately forming the thermoplastic lid and the metal overcap, said forming of the lid and overcap including the step of providing a space between the overcap and lid skirt sufficient to allow the lid skirt to bow outwardly when it passes over the throat bead as the lid and overcap are placed on the container,
- overlyingly engaging the overcap and the lid so that the darts engage the outer surface of the lid skirt to thereby place the lid in a substantially fixed, centralized, spatial radial positional relationship with the overcap,
- engaging the overcap tongue terminal edge portions in the lid annular retaining bead thereby removably securing the overcap to the lid and forming a thermoplastic lid-metal overcap container closure assembly,
- removably securing the assembly to the throat bead by pressing the assembly over the throat and allowing the lid skirt to bow outwardly into the space between the overcap and lid skirts as the lid skirt passes over the bead, and
- engaging the lower edge portion of the overcap skirt with the lower portion of the lid skirt to prevent the lid skirt of the secured assembly from bowing outwardly and from accidentally coming out of abutting engagement with the throat bead.
2. A method of forming a container of the type having
- a container body;
- a substantially rigid, upwardly extending throat joined to one end of the container body, the throat having at its uppermost end a radially outwardly protruding bead;
- a reclosable thermoplastic lid, the lid having
- a top portion including a peripheral raised rim a portion of which abuttingly overlies the bead, a recessed central panel radially inward of the rim, and an annular sloping panel connecting the rim and the recessed central panel,
- a peripheral molded skirt adjoining and depending downwardly from the rim, said skirt having an undercut molded into its interior surface adjacent the junction of the rim and the skirt, the un-

12

- dercut being in abutting engagement with the bead to thereby removably secure the thermoplastic lid to the throat; and
- a removable metal overcap overlyingly engaging the lid, the overcap having
- a raised rim overlying the lid rim,
- a peripheral skirt adjoining and depending downwardly from the overcap rim, the skirt having engaging means for engaging the lid skirt, the engaging means including an annular radially inwardly-projecting curl at the lower terminal edge of the lid skirt, the curl engaging a portion of the bottom of the lid, and including integral darts in and projecting radially inwardly from the overcap skirt, the overcap skirt, except for the engaging means, being spaced from the lid skirt, the engaging means effecting a substantially fixed centralized radial positional relationship between the overcap and the lid and preventing the lid skirt from bowing outwardly and from accidentally coming out of abutting engagement with the throat bead,
- a recessed interior substantially full and substantially flat central panel radially inward of the overcap rim, the central panel having a tear strip defined by scoring dividing the central panel and terminating it in the overcap rim, and an integral pull ring at the beginning of the tear strip;
- the method which comprises:
- separately forming the thermoplastic lid and the metal overcap, said forming of the lid and overcap including the step of providing a space between the overcap and lid skirt sufficient to allow the lid skirt to bow outwardly when it passes over the throat bead as the lid and overcap are placed on the container,
- overlyingly engaging the overcap and the lid so that the darts engage the outer surface of the lid skirt to thereby place the lid in a substantially fixed, centralized, spatial radial positional relationship with the overcap,
- engaging the overcap tongue terminal edge portions in the lid annular retaining bead thereby removably securing the overcap to the lid and forming a thermoplastic lid-metal overcap container closure assembly,
- removably securing the assembly to the throat bead by pressing the assembly over the throat and allowing the lid skirt to bow outwardly into the space between the overcap and lid skirts as the lid skirt passes over the bead, and,
- engaging the lower edge portion of the overcap skirt with a lower portion of the lid skirt to prevent the lid skirt of the secured assembly from bowing outwardly and from accidentally coming out of abutting engagement with the throat bead.

* * * * *